UW TSL Types of Components & Component Processing

UNIVERSITY of WASHINGTON

Learning Objectives:

After completion of this training module staff will be able to:

- Recall the different types of products (component type & attributes) that UW Transfusion Lab receives from each of its suppliers.
- Identify product attributes and collection type from the product label.
- List the types of secondary component processing performed at UW Transfusion Lab.
- Demonstrate understanding of the purpose and importance of secondary component processing.
- Demonstrate understanding of the effects of secondary component processing on expiration dates.

Components at UW Transfusion Lab

- **Red Blood Cells**
  - Supplied primarily by Bloodworks Northwest (BWNW) and supplemented by American Red Cross Portland (ARC)
- **Platelets**
  - Supplied primarily by BWNW and supplemented by ARC
- **Frozen Plasma**
  - Supplied by BWNW
- **Cryoprecipitate**
  - Supplied by BWNW
- **Granuloctyes**
  - Supplied by BWNW

Red Blood Cell Attributes

- **Leukoreduction**
  - **This process reduces the number of White Blood Cells to <$5x10^6$ per unit, which reduces the risk of:**
    - **CMV transmission**
    - **Alloimmunization to HLA antibodies**
    - **Febrile Non-Hemolytic Transfusion Reactions.**
  - **Almost all RBC units are Leukoreduced by the suppliers. In the event that a unit is received without leukoreduction, it must be approved by the Medical Director for use before issue.**

Red Blood Cell Attributes Continued

- **Irradiation**
  - **Some RBCs may be Irradiated by the supplier**
  - **Most RBCs will be received from the supplier without irradiation, these units will require irradiation at UW.**
  - **All RBCs MUST be irradiated before they are issued at UW**
  - **All RBCs MUST be irradiated before sent to NW or FHCC or to BB2 location**
  - **Irradiation reduces the risk of Transfusion-Associated Graft vs. Host Disease (TA-GVHD) by inactivating donor T-Lymphocytes.**
  - **More information on irradiation and TA-GVHD can be found on slides 21-22.**

Red Blood Cell Attributes Continued

- **Collection Type**
  - **Most RBCs are collected from whole blood donations**
  - **Some RBCs are collected via apheresis or Double Red Cell donations, this can result in 2 units with the same Donor ID and different product codes.**

Red Blood Cells: Irradiated

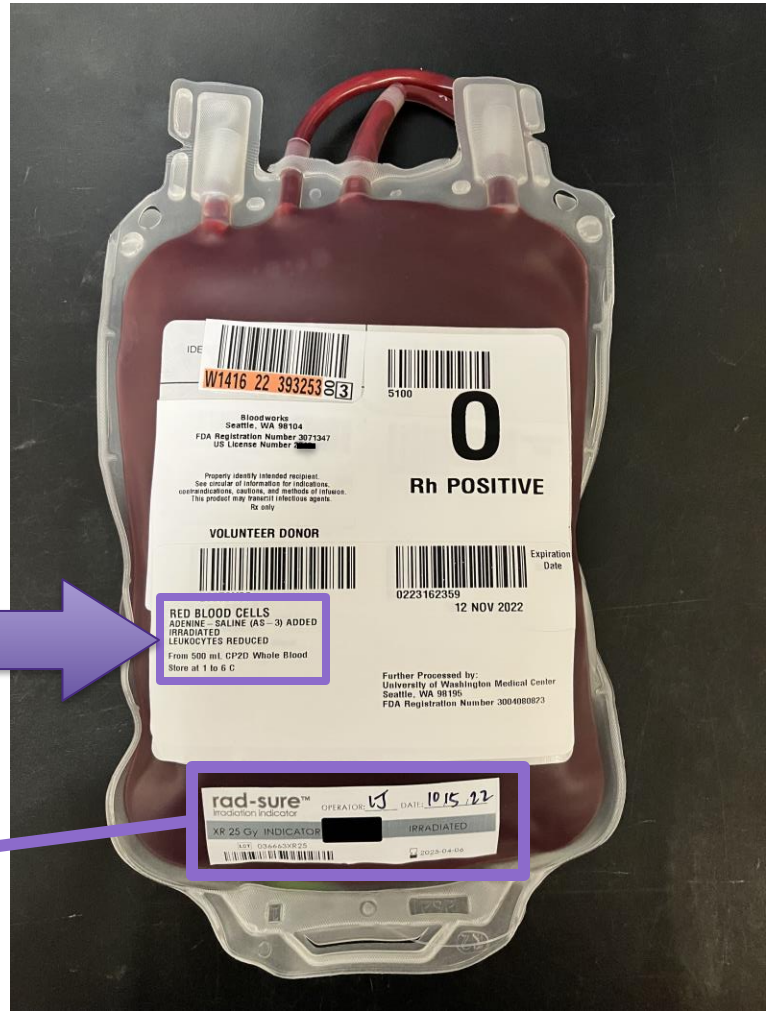
This is an example of a typical RBC that is Leukoreduced, Irradiated, and Collected from Whole Blood.

All of these attributes are listed on the zoomed in area of the label as seen below.

RED BLOOD CELLS
ADENINE – SALINE (AS – 3) ADDED
IRRADIATED
LEUKOCYTES REDUCED

From 500 mL CP2D Whole Blood

Store at 1 to 6 C

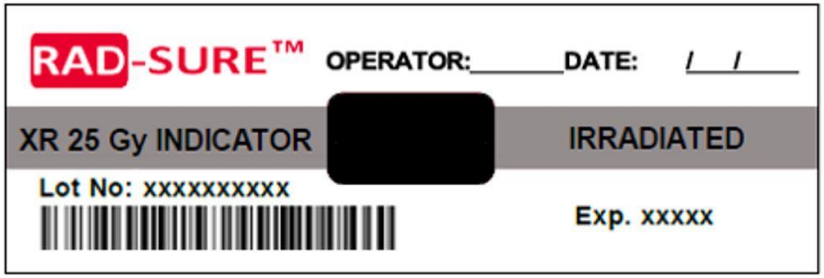


When checking the irradiation status of a component, it is important to verify that both the component label & rad-sure indicator show that the unit has been irradiated (see next slide for rad-sure indicator examples).

Rad-sure Irradiation Indicators

This irradiation sticker shows that the component has either NOT been irradiated or the dose of radiation delivered was not adequate.

This irradiation sticker shows that the component HAS been adequately irradiated.

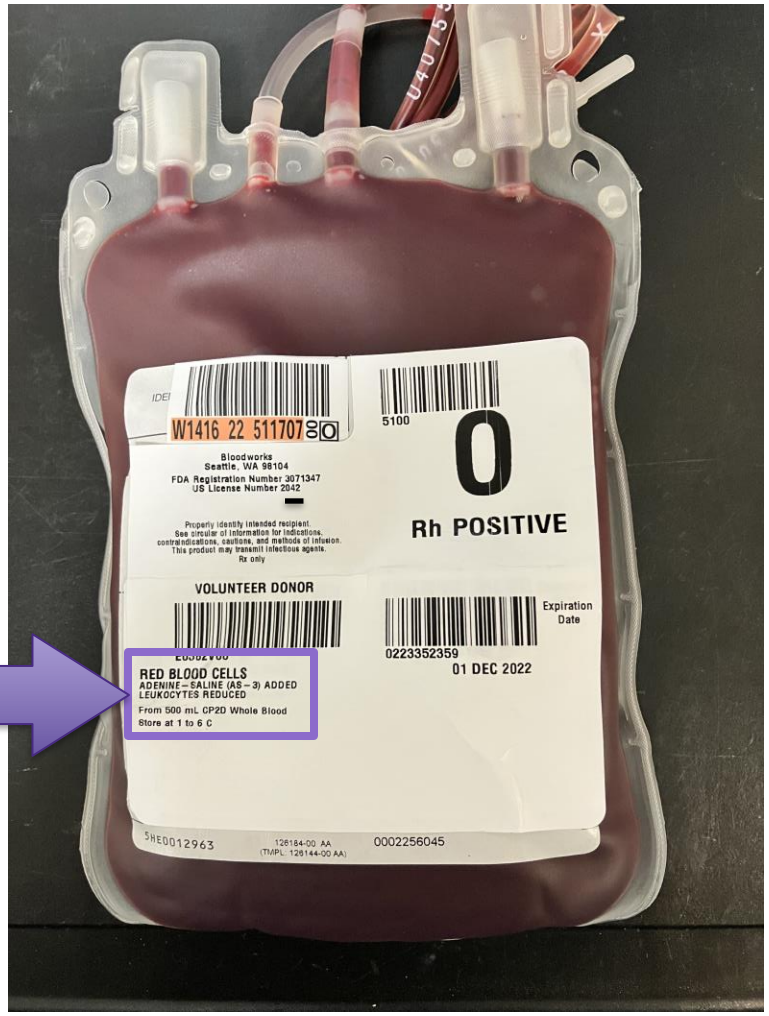


Red Blood Cells: Non-Irradiated

This Leukoreduced, Collected from Whole Blood RBC is an example of how most units arrive from the suppliers.

Most RBCs arrive without irradiation and are irradiated here at UW with X-ray irradiation.

RED BLOOD CELLS
ADENINE–SALINE (AS–3) ADDED
LEUKOCYTES REDUCED
From 500 mL CP2D Whole Blood
Store at 1 to 6 C



Platelets

- **Irradiation/Pathogen Reduction**
  - **Most platelets are Irradiated or Pathogen Reduced (psoralen-treated) by the supplier.**
  - **Pathogen Reduced (psoralen-treated) platelets do not require Irradiation.**
    - **This is because the Pathogen Reduction process also inactivates residual White Blood Cells.**
  - **Occasionally platelets are received from the supplier that have not been Irradiated or Pathogen Reduced, these units will require Irradiation at UW.**

Platelets Continued

- **Collection Types**
  - **Platelets are typically collected via Apheresis, meaning we often see multiple units collected from the same donor (with the same Donor ID Number) and have different container numbers/product codes.**
  - **Apheresis platelets can be collected in the donor's plasma or in Platelet Additive Solution (PAS).**
  - **When platelets are collected in PAS, the majority of the donor's plasma is removed during the collection process and replaced with PAS (an electrolyte solution).**
  - **PAS platelets can be given to MOST recipients without consideration for the ABO type of the platelet.**
  - **Double bagged apheresis platelets are collected in 2 bags that are connected by tubing. This allows adequate gas exchange for large volume units.**

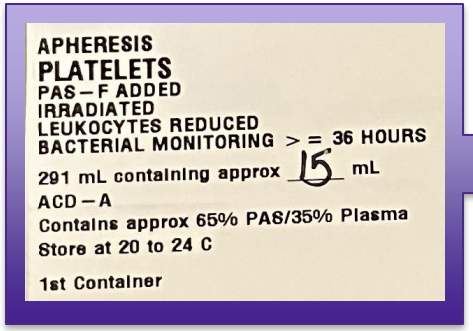
Platelets Continued

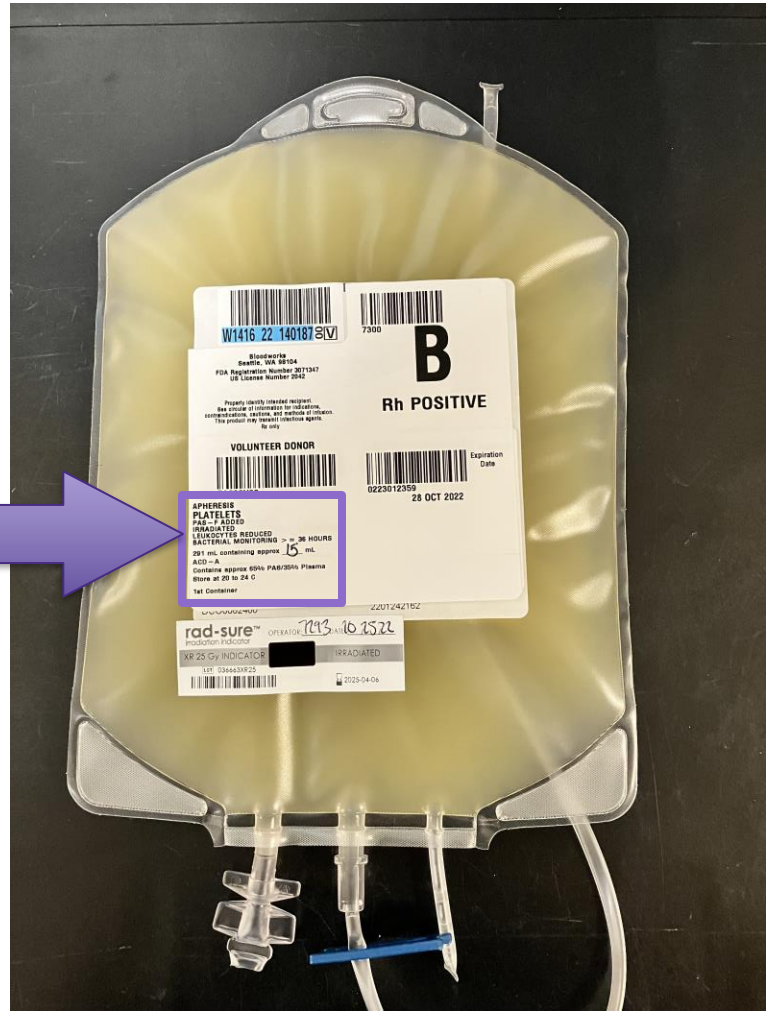
- **HLA Typing**
  - **BWNW provides the HLA type of platelet units when available.**
  - **This allows us to find appropriate units for certain recipients that require HLA selected units.**

Platelets: PAS, Irradiated

This is an example of a typical unit of Leukoreduced platelets that were collected via Apheresis in PAS, that has been irradiated.

Replacement of donor plasma with PAS results in lower isoagglutinin titers which allows them to be used for a wider range of patients.





PAS platelets are an important part of inventory and patient management at UW due to the volume and complexity of patients that we provide transfusion support for.

Platelets: In Plasma, Irradiated

This is an example of a typical unit of Leukoreduced platelets that were collected via Apheresis in the donor's Plasma, that has been irradiated.

APHERESIS
PLATELETS
IRRADIATED
LEUKOCYTES REDUCED
BACTERIAL MONITORING 7D
182 mL containing approx 30 mL ACD – A
Store at 20 to 24 C
3rd Container

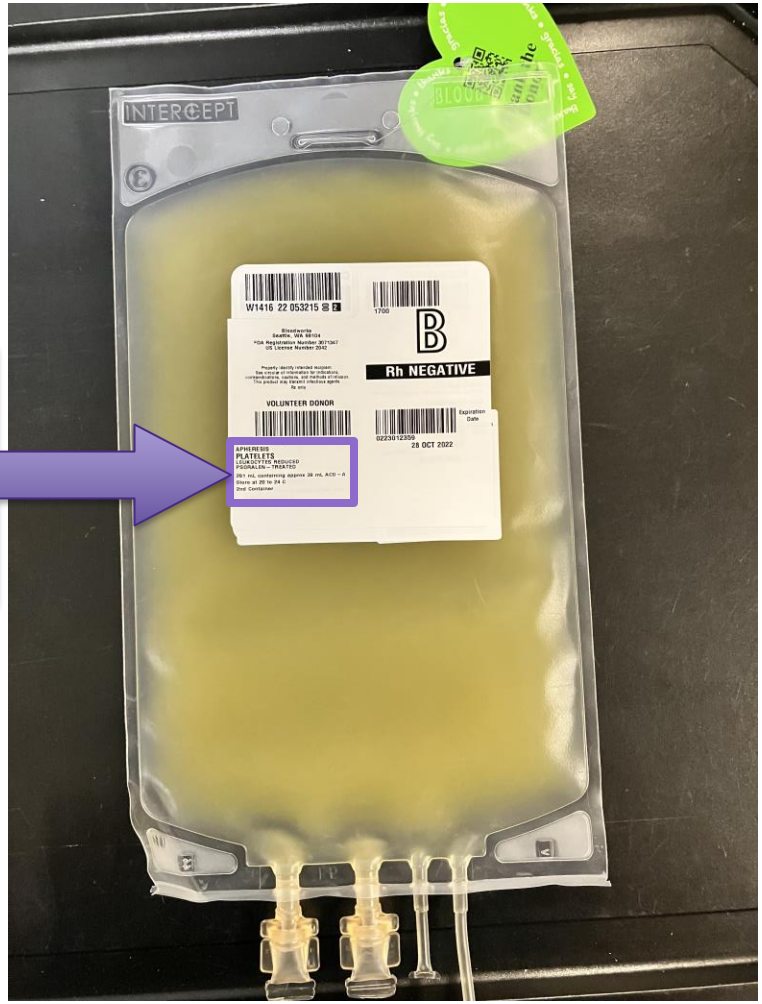
Because Apheresis collection often results in multiple units collected with the same donor ID number (DIN) it is important to also pay attention to the container number when allocating and issuing units. The example above shows that this is the 3rd container from this apheresis collection.

Platelets: In Plasma, Psoralen-Treated

This is an example of a typical unit of Leukoreduced platelets that were collected via Apheresis in the donor's Plasma, that has been Psoralen-Treated or Pathogen Reduced.

Psoralen-Treated platelets are not irradiated.

APHERESIS
PLATELETS
LEUKOCYTES REDUCED
PSORALEN – TREATED
281 mL containing approx 39 mL ACD – A
Store at 20 to 24 C
2nd Container



Psoralen-Treated platelets use a bag that is a different shape than the previous non-Psoralen-Treated examples.

Psoralen-Treated platelets can be collected in PAS or in the donor's plasma.

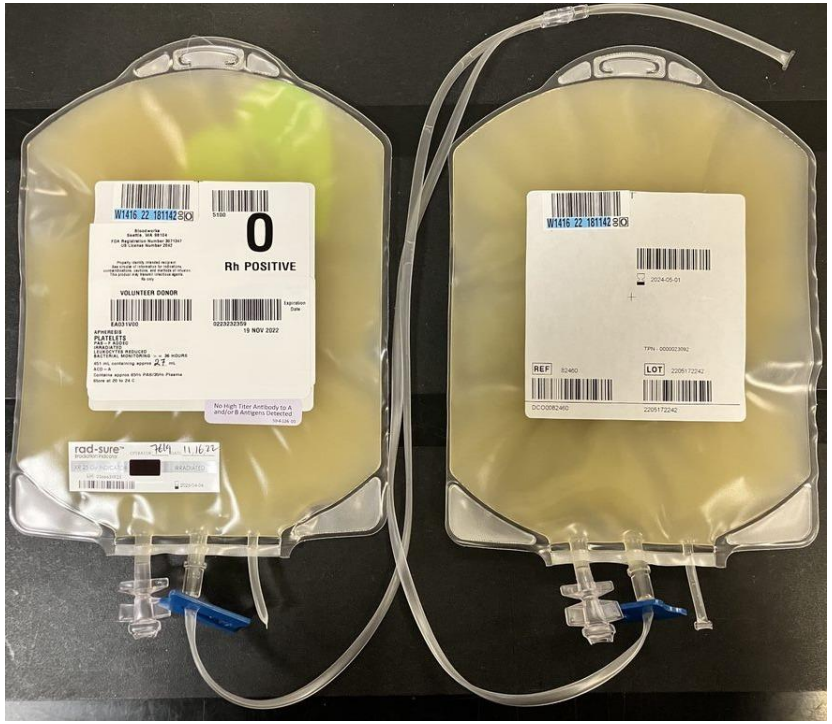
Platelets: Double Bagged Apheresis

This is an example of a double bagged apheresis platelet.

As you can see in the picture, the bags are connected to each other with tubing.

This tubing is used to combine the bags into a single unit before transfusion, this MUST be done before issuing the unit.

Combining double bagged units should be done as close to the transfusion time as possible, as this process shortens the expiration date to 24 hours from the time that they are combined.



Frozen Plasma

- **Collection Volume**
  - **Regular Volume Frozen Plasma units are typically about 188mL to 330mL**
  - **Jumbo Frozen Plasma units are typically about 400mL to 600mL (these units count as 2 regular units).**

Frozen Plasma: Jumbo Collection

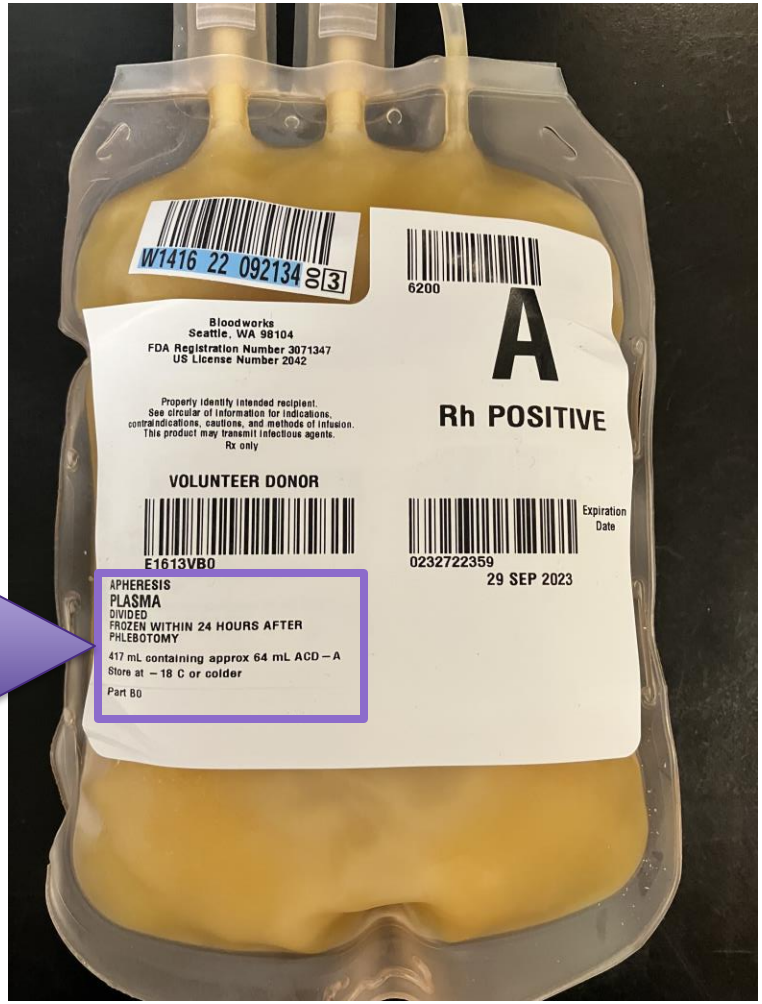
This is an example of a Jumbo unit of Frozen Plasma collected via Apheresis.

The label below shows that the volume of the unit is 417 mL.

It is also important to note the component part (Part B0). As with other apheresis collections, apheresis plasma collections often result in multiple containers with the same DIN.

APHERESIS
PLASMA
DIVIDED
FROZEN WITHIN 24 HOURS AFTER PHLEBOTOMY
417 mL containing approx 64 mL ACD – A
Store at – 18 C or colder
Part B0

This unit has NOT been thawed yet.

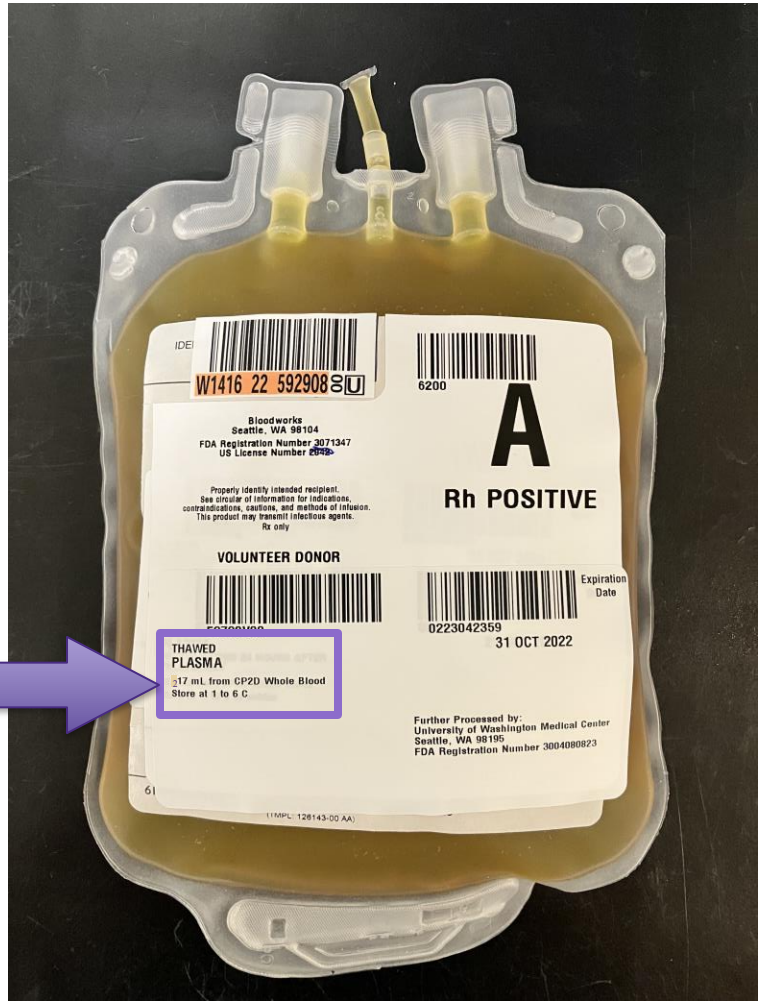


Frozen Plasma:
Normal Volume Collection

This is an example of a normal volume collection unit of Thawed Plasma collected via Apheresis.

The label below shows that the volume of the unit is 217 mL and that this unit has been thawed.

THAWED
PLASMA
217 mL from CP2D Whole Blood
Store at 1 to 6 C



Cryoprecipitate (Frozen)

- **Collection Type**
  - **Single**
    - **Single Cryoprecipitate units are prepared from plasma of a single donor.**
    - **These units are used only for neonates <4 months of age and only type AB is stocked from our suppliers.**
    - **Volume of a single unit is about 10-20mL**
  - **Pooled**
    - **Pooled Cryoprecipitate units consist of 5 single units that are pooled together by the manufacturer to create a single pooled unit.**
    - **These units are used for adult patients and all blood types are stocked.**

Granulocytes

- Granulocytes contain leukocytes
- Granulocyte orders must be approved by the TSL medical director in advance.
- Collection
  - Granulocytes are collected via apheresis
- Irradiation
  - Granulocytes may arrive from the supplier already irradiated or may need to be irradiated by UW TSL upon arrival.

Secondary Component Processing Performed at UW Transfusion Lab

- Irradiation
- Thawing
- Volume Reduction
- Washing
- Aliquots for Neonates
- Packing or Reconstituting RBCs for Intrauterine Transfusion or Neonatal Exchange Transfusion

Irradiation

- **Products Irradiation can be performed on:**
  - **All cellular products (RBCs, Platelets, Granulocytes)**
- **Purpose of Irradiation:**
  - **To prevent Transfusion-Associated Graft vs. Host Disease (TA-GVHD) by inactivating donor T-Lymphocytes.**
  - **TA-GVHD occurs when transfused lymphocytes mount an immune response against the recipient and is usually fatal.**
  - **UW Transfusion Lab requires Irradiation of ALL cellular products in order to prevent TA-GVHD and promote transfusion safety.**

Irradiation Continued

- **Basic Overview of Irradiation process:**
  - Units are labeled with Rad-Sure Indicator Sticker
  - Units are scanned into the irradiator tablet
  - Units are placed in the Irradiator and during the cycle a minimum dose of 25Gy is delivered to the center of the unit
  - The Rad-Sure Indicator is checked to ensure irradiation was adequate
  - The unit is re-labeled as irradiated
- **Effect of Irradiation on Expiration Date:**
  - If the original expiration date is >28 days from the irradiation date, then the expiration date will become 28 days from the date of irradiation.
  - If the original expiration date is ≤28 days from the irradiation date, then the unit will retain its original expiration date.

Thawing

- **Products Thawing is performed on:**
  - **Frozen Components (Frozen Plasma, Cryoprecipitate)**
- **Purpose of Thawing:**
  - **To return frozen components to a liquid state for transfusion.**
  - **These products are stored frozen in order to prolong their shelf-life and prevent wastage but need to be liquid to be transfused to the recipient.**
  - **Some clotting factors are sensitive to heat, the goal of the thawing process is to return the frozen product to a liquid state while maintaining the effectiveness of the clotting factors that are present. This is why selecting the appropriate cycle time is an important step in the thawing process.**

Thawing Continued

- **Basic Overview of Thawing Process:**
  - The component is placed in a plastic overwrap and the appropriate cycle on the thawer is selected.
  - The thawer gently agitates the component while maintaining a water temperature of 30-37ºC.
  - After thawing is complete, the unit is re-labeled as Thawed.
- **Effect of Thawing on Expiration Date:**
  - Thawed Plasma: Expiration becomes 5 days from thaw and is stored in a refrigerator at 1-6ºC.
  - Thawed Cryoprecipitate: Expiration becomes 6 hours from thaw and is stored at room temperature.

Volume Reduction

- **Products Volume Reduction is performed on:**
  - **Platelets**
- **Purpose of Volume Reduction:**
  - **To reduce the amount of plasma present in a unit of platelets.**
  - **This can be done to:**
    - **Reduce the risk of Transfusion Associated Cardiac Overload (TACO) in recipients who may be sensitive to extra fluid.**
    - **For recipients with a history of severe allergic transfusion reaction to plasma containing components.**
    - **To reduce the amount of ABO incompatible plasma infused to specific recipients.**

Volume Reduction Continued

- **Basic Overview of Volume Reduction Process:**
  - An additional bag is attached to the unit, typically with a sterile welder.
  - The unit is centrifuged in a refrigerated centrifuge that maintains appropriate temperature (20-24ºC) throughout the centrifuge process.
  - The supernatant (liquid portion, usually plasma) is removed from the unit until the unit volume is 100 mL.
  - The unit is re-labeled with the new volume.
- **Effect of Volume Reduction on Expiration Date:**
  - Expiration becomes 4 hours from the time the plasma is removed from the unit.

Washing

- **Products Washing is performed on:**
  - **Platelets**
  - **Red Blood Cells**
- **Purpose of Washing:**
  - **To remove plasma proteins, electrolytes, and antibodies from components**
  - **This can be beneficial for recipients who have a history of plasma-related transfusion reactions.**

Washing Continued

- **Basic Overview of Washing Process:**
  - **The unit is placed into the cell washer, and the cell washer performs an automated process where it performs the following steps:**
    - **Centrifuges the unit**
    - **Removes most of the liquid**
    - **Fills the bag with appropriate washing solution**
  - **The unit is relabeled as washed with new volume.**
- **Effect of Washing on Expiration Date:**
  - **Platelets: 4 hours from when the unit is spiked.**
  - **Red Blood Cells: 24 hours from when the unit is spiked.**

Aliquots for Neonates

- **Products Aliquots are made from:**
  - **Platelets**
  - **Red Blood Cells**
  - **Thawed Plasma**
  - **Cryoprecipitate**
- **Purpose of Creating an Aliquot:**
  - **To provide the appropriate volume of the specified component.**
  - **This is typically done for neonates who need very low volume transfusions.**

Aliquots for Neonates Continued

- **Basic Overview of Aliquot Process:**
  - The parent unit is attached to a syringe or smaller bag either by spiking the parent unit (open system) or with a sterile welder (closed system).
  - The requested volume plus 3-5mL extra to account for transfusion tubing is transferred to the syringe or smaller bag.
  - The aliquot is labeled, and the parent bag is re-labeled with the new volume.
- **Effect of Creating an Aliquot on Expiration Date:**
  - See Blood Component Preparation SOP for details on expiration date changes to parent unit and aliquot based on the type of system used (open vs. closed).

Packing or Reconstituting RBCs for Intrauterine Transfusion or Neonatal Exchange Transfusion

- This processing is complex and is only performed by trained MLS staff.
- Detailed, hands-on training will be provided on this process before a staff member is determined competent to perform this process independently.
- It is mentioned in this training module only to bring awareness to all staff that this is a process that is performed at UW Transfusion Lab.

Review Complete! Please take the required quiz in MTS.